

Sai Krishna Deepak Maram

Interests

Computer Security, Systems

Education

- 2018-Present **PhD, Computer Science.**
Cornell University, Ithaca
Advisor: *Ari Juels*
- 2012–2016 **Bachelor of Technology, Computer Science.**
Indian Institute of Technology, Bombay
Honors in Computer Science
GPA: 8.91/10, Class rank: 20/100
- 2012 **Higher Secondary Examination.**
Narayana Junior College, Hyderabad
All India Rank (IIT-JEE): 12/500,000

Publications

- SEFM'16 **Incentive Stackelberg Mean-payoff Games, IIT Bombay, [paper] [tool].**
Anshul Gupta, Sven Schewe, Ashutosh Trivedi, Maram Sai Krishna Deepak, Bharath Kumar
Solving Mean-payoff games (MPG) is an important problem in the area of formal verification. The project aims to devise strategies using incentive equilibria for playing multi-player mean-payoff games (MMPG). Incentive equilibria are a kind of generalization of Nash equilibria and Stackelberg equilibria. I have implemented a tool to solve MMPG and used it to show that incentive equilibria perform significantly better than other equilibria. We have published our findings at SEFM'16.

Research Experience

- Summer 2015 **SCION: Next generation Internet Architecture, ETH Zurich, [talk].**
Research Internship, Guide: *Prof. Adrian Perrig*
SCION is a new Internet architecture designed to provide route control, failure isolation and explicit trust information for end-to-end communications. My task was to devise attacks on SCION. I conducted a literature survey studying DDoS attacks such as *coremelt*, *crossfire* to understand different attack categories. Later, I successfully designed a brute force attack using MAC of the Opaque field used in SCION. I have suggested defenses for this attack in which we increase the attack complexity by using longer MAC fields.
- Summer 2015 **Efficient path-revocation system for SCION, ETH Zurich.**
Research Internship, Guide: *Prof. Adrian Perrig*
I was involved in a project to develop an efficient and secure path-revocation system for source-controlled routing architectures like SCION. I have developed SCION-DSE, a discrete event simulator useful to run simulations of SCION. Using SCION-DSE and SSFNet (BGP simulator), I devised experiments to show that SCION achieves 45x lesser packet overhead and a slightly better convergence time than BGP.

Spring 2015 **Wireless Bit-rate adaptation algorithm: Minstrel, IIT Bombay, [report].**

Research and Development Project, *Guide: Prof. Mythili Vutkuru*

We tried to experiment with the 'LookAroundRate' parameter of the Minstrel algorithm which is used to adapt the bit-rate to the current wireless channel conditions using a network simulator, ns-3. Although we found some benefits in throughput and delay by varying look around rates, they were not substantial enough to pursue further research. As part of this project, we also formulated bit-rate adaptation problem as an instance of the Multi-armed bandit problem.

Fall 2015 **Modeling information flow for cloud security, IIT Bombay.**

Bachelors' Thesis project, *Guide: Prof. R.K. Shyamasundar*

I was involved in developing a new information flow model RWFM - Readers Writers Flow Model. RWFM uses explicit readers and writers that provides an intuitive label model for capturing relationships and constraints of information flow. We tried to apply this model to Cloud Systems such as Hadoop. We started the work in this direction and after some unsuccessful attempts, we shelved it off finding that they were incompatible.

Industry Experience

2016-17 **Oracle Server Technology, Oracle, Bangalore.**

Guide: Yamini K.B.

I have worked in the development teams of web servers such as WebLogic Server and the Glassfish server. Involved in the implementation of changes due to JSR 366 in Glassfish. Developed core features in the deployment module which was released as part of Java EE RI 8.

Summer 2014 **Bid Automation in paid search, Housing.com, Mumbai.**

Industry Internship, Guide: Prateek Bhandari

We modeled an algorithm that optimizes the bids placed on ads displayed in Google Search Engine using Google AdWords API. The algorithm is based on factors such as the number of clicks the keyword has generated, cost it incurred and impressions. We have further enhanced the algorithm to adjust bids placed on a keyword according to the demand supply data of the area corresponding to it.

Honors and Awards

- Secured All India Rank 12 in **IIT-JEE** out of 5,00,000 students 2012
- Secured All India Rank 36 in **AIEEE** out of 11,00,000 students 2012
- Secured All India Rank 14 in **ISAT** and All India Rank 18 in **VIT-EEE** 2012
- Recipient of KVPY scholarship and have attended VIJYOSHI Camp 2012
- Awarded merit certificate for being in top 1% in National Standard Examination - Astronomy 2011

Teaching

Fall 2015 **Department Academic Volunteer Program.**

Data Structures and Algorithms

The program is designed to help sophomores with the basics of Data Structures and Algorithms. Served as a tutor and held weekly sessions to help out the students.

Spring 2016 **Teaching Assistant.**

CS101: Computer Programming

Worked as a TA for the CS101 course aimed at freshers of all departments. Helped in conducting the lab sessions and setting questions for weekly labs, examinations.

Other Projects

Spring 2016 **Android Malware Detection**, *Network Security, Machine Learning*, [report].

Guide: Prof. Bernard Menzes

Over a dataset consisting of a mix of benign and malicious applications, we have applied Unsupervised Learning techniques to detect malicious apps. Choosing app permissions and intent information as features, we use SVD to find the optimal number of clusters followed by K-means clustering. In a given cluster, we then apply kNN classifier to identify Android Malware.

Spring 2016 **Arcade Learning Environment**, *Reinforcement Learning*, [report].

Guide: Prof. Shivaram Kalyanakrishnan

As part of a course on Reinforcement Learning, we developed agents to solve maze games in Atari 2600 - Pacman, Bank Heist and Amidar. Using tailor-made algorithms for the 3 games, we have achieved better performance than that published in the famous DQN(Deep Q-networks) paper.

Spring 2015 **OS Simulator**, *Operating Systems*.

Guide: Prof. Dhananjay M. Dhamdhare

We have designed and implemented data structures and algorithms for managing page tables, page faults, Memory Management Unit(MMU), directory structures, and file space allocations.

Fall 2014 **Web portal for food orders**.

Guide: Prof. Nandlal L. Sarda

We developed a web interface for managing food orders of a company by modeling entities such as Users, Sellers, Orders using ER diagrams. Further, we deployed this using Apache Tomcat server with PostgreSQL as back-end and JSP as front-end.

Spring 2013 **Tetris**.

Guide: Prof. Amitabha Sanyal

We have implemented a Tetris player using functional programming language, PLT Scheme. We used minimax algorithm to guess the best possible move for the player at any stage.

Interests and extra-curricular activity

- CTF team [team link]
- Worked as a member of *Insight*(IIT-B newsletter) under the article *Mission and Vision of IIT Bombay* and wrote a sub-article for the same
- Bagged 1st place in district level Chess competition under Sub-Junior Category at the age of 7 and represented my district in State level Chess Competitions for four consecutive years.
- Designed a Wireless Controlled Bot for a competition - *XLR8* at IIT Bombay that bagged 1st place in 2012

References

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